

REMARKS

Claims 11-17, all the claims pending in the application, stand rejected. Claims 11 and 13 have been amended. The Examiner's kind suggestions for improving the clarity of the claims are appreciated and adopted.

Claim Rejections - 35 USC 102

Claims 11-16 are rejected under 35 USC 102(b) as being anticipated by Kiik et al (EP 0 866 502 A). This rejection is traversed for at least the following reasons.

The invention of claim 11 is directed to the arrangement of a linear light detector apparatus that is particularly suited to detect a plurality of concurrently scanning spot beams, as stated in the preamble of the claim. First, the device permits light from separate and distinct sources to be concurrently detected, as is clear from the illustration in Fig. 1 where beams 159a-159c are detected by sections 111-113, respectively. Second, the beams are from respective scanning spots, as taught at paragraph [30]. Third, the light detector is specified as being "linear," which suggests to one skilled in the art that the elements are arranged along a common axis, as is clear from the illustration in Fig. 5 for sections 502. This combination of features clearly distinguishes the invention from the prior art, as subsequently discussed.

Turning next to the body of the claim, Applicants note that the structure of the detector is specified as comprising (1) a plurality of light detector sections, where (2) the sections are disposed linearly along a common axis, consistent with the overall "linear" character of the detector. In order to better couple the unique environment defined by the preamble to the limitations in the body of the claim, thereby providing added life and breath to the claim, this limitation has now been amended. In particular, the claim now specifies that each of the plural

detector sections is “positioned to detect light concurrently with other detector sections from a respective scanning beam” and comprises light detector elements that are (1) adjacent and (2) “disposed linearly along said common axis.”

In addition to tying the limitations in the preamble to the body of the claim, these structural statements identify a unique arrangement that can capture the concurrently existing and respective scanning light beams as they traverse along a linear locus on an object. The enhanced efficiencies and speed provided when a given linear area is scanned concurrently by plural beams, rather than a single beam, is readily apparent. Nothing of this sort is taught in the prior art. Moreover, the added value of having the signals from each beam detected separately as the beam scans, rather than by a single line of detector elements, would be clear to one skilled in the art, as parallel and concurrent outputs of detected signals can be obtained. That is, the invention permits parallel and concurrent generation of beams and parallel and concurrent generation of output detection signals, in a manner not taught in the art.

Further, the claimed linear light detector has at least one multi-stage storage device operative to receive in parallel an input from the plurality of light detectors. This arrangement, as illustrated in Figs. 1 and 5, enhances the speed and effectiveness of the detector since the outputting of parallel data streams will allow a parallel processing and/or storage of the data.

The result in the stated environment is significant because the scanned objects (particularly in the case of semiconductor chips or dies) can be moved past the detection section of a production line at a higher rate of speed than would otherwise be possible with a linear detector that has only a single beam and only a single line of detection elements. While efficiency may be improved by breaking the single line of detection elements into separately read

segments, it does not achieve the same result since the delay in waiting for the scan of a single beam to traverse the entire object inherently detracts from efficiency. The combination of (1) a concurrent detection of plural scanning spot beams and (2) the parallel capture and readout of the data in parallel serial streams provides a unique structure that is not found in the prior art.

Kiik et al

The Examiner cites Kiik et al for a disclosure of a linear light detector apparatus 100 that has a plurality of adjacent light detector sections (102, 104) that are disposed linearly along a common axis, as illustrated in Fig. 1. The Examiner asserts that each detector section has at least one multi-stage storage device 110 operative to receive in parallel an input from the plurality of light detectors and to serially read out 112 information stored in the multiple stages. The Examiner notes that each storage device 110 has a plurality (4) of registers, each register having plural (4) vertical register elements e.g., 110AA-110DA, as illustrated in Fig. 3.

As explained at col. 2, lines 19-45 and at col. 8, line 40, in operation, charges are transferred down separate columns of imaging subsections in a vertical direction, as the object under observation is moved past the sensor, allowing charges to accumulate for each portion of the image. At the readout section 104, the accumulated charges are transferred to vertically oriented intermediate registers 110, and the charges are passed vertically down the stages of a respective register column to a horizontal segment register 112, in preparation for serial readout. The register 112 passes its content to isolation register 114, which is then passed to output node structure 116.

Nothing in the disclosure of Kiik et al teaches the key features of the present invention, namely, the ability to simultaneously capture the images from plural concurrently scanning

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beams using a linearly arranged detector structure, and to serially read out the captured images in parallel. These features were originally recited in the rejected independent apparatus and method claims, and are now further clarified in the independent apparatus claims.

The Examiner asserts that Kiik discloses a plurality of concurrently scanning beams at col 1, lines 35-44. However, a careful reading of that text will reveal that there is no teaching at all of scanning beams, let alone the existence of concurrent scanning beams. In fact, the only mention of a CCD at the cited text is that of a single line scan CCD sensor oriented perpendicular to a direction of movement, as in the conventional art. There is a mention of “advanced” linear CCD sensors that use time delays (TDI CCD sensors), but this reference provides no suggestion whatsoever of plural concurrently scanning beams. Not even the more detailed discussion of TDI CCD sensors at col. 2, lines 19-45 or the illustration in Fig. 9 teaches or suggests the use of plural concurrently scanning beams or the simultaneous detection of their signals by respective detecting sections.

Again with regard to claim 1, the original definition of a device that can capture signals resulting from plural concurrently scanning beams, as recited in the preamble, has now been supplemented by specifying that each detector section is positioned to detect light concurrently with respect to other detectors from respective scanning beams. It also has been specified that the plurality of adjacent light detectors that form each detector section are disposed linearly along the same common axis that is shared by the plural detector sections. This positional relationship, especially with respect to the plural concurrently scanning spot beams, is unique and is not taught in Kiik et al. The reference does not concern plural spot beams and illustrates

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in Figs. 1 and 3 an imaging section 102 that can include a plurality of imaging subsections for capturing the content of pixels, generated at best from a single light source.

With regard to claim 15, the fundamental feature of the invention based upon detection and storage of the content of a plurality of concurrently scanning beams is already specified and is not found in Kiik et al. Indeed, nothing in Kiik et al indicates that the reference recognized the advantages of plural concurrent scans, the challenges that would arise from implementing plural concurrent scans and the solutions to those challenges, as presented by the invention as claimed.

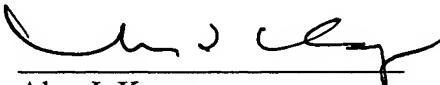
The claims dependent on independent claims 11 and 15 further specify or amplify the unique features not taught in Kiik et al, including the temporary shift register that receives in each stage in parallel the content of a corresponding detector. In Kiik et al, each of the registers in storage device 110 is vertical and does not receive signals in parallel. Separate columnar registers receive signals, but they are not of a corresponding detector. The transfer signals that read out a plurality of stages in series, as recited in claim 14, is not taught in Kiik et al. Finally, the synchronizing step of claim 16 clearly cannot be taught in the absence of plural scanning beams, and the concurrent capturing and storing in only a portion of the sections, as recited in claim 17, is not taught in Kiik et al.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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